DET KONGELIGE DEPARTEMENT
FOR HANDEL, SJØFART, INDUSTRI, HÅNDVERK OG FISKERI

NORGES SVALBARD- OG ISHAVS-UNDERSØKELSER
LEDER: ADOLF HOEL

MEDDELELSE Nr. 17

NOTES ON SOME ARCTIC FOSSIL WOOD,

WITH A REDESCRIPTION OF *CUPRESSINOXYLON POLYOMMATUM*, CRAMER

BY
OVE ARBO HØEG

WITH 3 PLATES

OSLO
I KOMMISJON HOS JACOB DYBWAD
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A. W. BRØGGERS BOKTRYKKERI A/S

1. A Sample of Wood from Franz Josef Land (PA 167 of the Paleontological Museum of the University, Oslo). — Pl. III figs 4—8.

Geologists visiting Franz Josef Land have always mentioned the abundance of fossil wood on these islands; reference to the literature will be found in my recent paper on wood from the Tertiary of East Greenland. But as far as I know no sample has yet been described with anatomical details, and no species have been identified among the samples observed there.

In 1930 the *Norges Svalbard- og Ishavs-undersøkelser* sent an expedition to these regions, and, among other collections, the leader, Dr. Gunnar Horn, brought home a sample of fossil wood from Cape Forbes. Although the preservation is poor it deserves to be described. It is not very much pressed, but the fossilisation has not been complete enough to preserve the more delicate details of the structure, the cell walls being represented by brittle fragments of black carbonaceous matter only.

The annual rings are well marked and rather wide, measuring more than 1 mm. They have a broad middle part, which is best preserved. Resin canals, vertical or horizontal, are not found.

The pores on the radial walls of the tracheids are usually not preserved; only in a few places, as visible in Pl. III figs 5 and 7, they are observable, being arranged in single series; remains of them may even be observed in the tangential section, where these walls are cut across. On the tangential walls there are bordered pits, too, in the summer wood. They are plainly visible in some places, as illustrated in Pl. III fig. 8.

The medullary rays are numerous; all of them are linear and uniseriate. Sometimes they are rather high, up to 20 cells, but usually lower, about 5 to 12 cells. Tracheidal cells have not been found, but the defective state of preservation makes it difficult to obtain

full certainty. The pores of the parenchymatous cells are not preserved, but the walls seem to be smooth.

Xylem parenchyma does not seem to occur; as to this point, too, the state of preservation causes some uncertainty, but if there had been any at the periphery of the annual rings it would in all probability have been observable in some place.

Affinity. — The uniseriate bordered pits on the radial walls of the tracheids, and the lack of resin canals, give evidence valuable for the identification of the wood; but still there is much uncertainty left. If the pits of the medullary rays had been of the abietinean type, it is very probable that they would still have been visible in one place or another; if this is admitted, *Cedroxylon* should be out of the question. But whether the wood is then a *Cupressinoxylon* or something else can scarcely be settled.

2. A *Piceoxylon* from Jackson Island, East Greenland (PA 118 of the Paleontological Museum of the University, Oslo). — Pl. I.

A sample of wood was picked up from the surface of the ground on Jackson Island by Mr Thor Halle, on the 1st of August, 1929, during one of the expeditions sent out by the *Norges Svalbard- og Ishavs-undersøkelser*. It is a fragment, probably from a stem, about 9 cm long, and about 4×2 cm thick. The anatomical structure is excellently preserved, apart from the effect of some pressure.

It is a typical *Piceoxylon*, belonging to the same species as those (PA 133 and 137) which I recently referred, with some doubt, to *P. laricinoides* m., from Myggbukta. It is scarcely necessary to specify the details, the more so as they will be visible from the photographs. But there are a few points worth mention.

The medullary rays show very markedly that peculiarity in which the two other specimens (133 and 137) differ from the bulk of the samples of *P. laricinoides*: In each of them, one or a few of the parenchymatous cells are slightly larger than the others, with dark contents and darker, rather thick, walls with distinct pores; the other cells have also simple pores of the same kind, but more sparingly (at the ends of the medullary rays are also seen tracheidal cells, with bordered pits observable in the tangential section). The difference between these two types of parenchymatous cells is very distinctly seen, in the tangential section (Pl. I figs 2 & 3) as well as in the radial one (Pl. I fig. 5).

Another peculiarity is the presence of a kind of parenchyma, which must be termed abnormal; possibly it is traumatic. Its appearance is evident from the photographs Pl. I figs 7 & 8. It is not altogether impossible that it has been developed in connection with a resin canal not visible in the section; but, at all events, it is decidedly different from the cells usually accompanying such canals.

This parenchyma has a good deai of resemblance to that of *Cedroxylon Orvini* m., also from Myggbukta; but the constant occurrence of regular resin ducts, both vertical and horizontal, puts it beyond doubt that our specimen from Jackson Island is a *Piceoxylon*, like the other two mentioned (PA 133 and 137), and not a *Cedroxylon*. Whether it should be separated specifically from *P. laricinoides* is a matter of taste; it does not seem necessary to do so, at least not at present.

3. The Type Specimen of *Cupressinoxylon polyommatum* Cramer, in the Possession of the National Museum of Ireland, Dublin. — Pl. II; Pl. III figs 1—3; text-fig. 1.

In connection with the examination of a collection of fossil wood of Tertiary age from East Greenland I had to form an opinion on some of the species of wood previously described from the Arctic, and, for that reason, made inquiry of the National Museum of Ireland in Dublin as to whether type specimens of any of the species described by Cramer in 1868 were preserved in that museum (cf. Cramer l. c. p. 170, see also p. 21 in the same work). The Director of the Department of Natural History, Dr P. O'Connor, very kindly answered my questions, and took the great trouble of making researches and inquiries, not only in his own museum, but also in the other scientific collections of Dublin.

It may be of value for the history of these specimens to quote from Dr O'Connor's letter (of March 11th, 1931):

"— I regret to inform you that my efforts to trace the specimen of wood of *Pinus McClurii* have been in vain. Extensive search has failed to locate it in this Museum, in Trinity College (Dublin University), in the University College or in the Geological Survey Department. It is not mentioned in our registers.

It is quite clear that Cramer has made a mistake in the description; for, in our copy (Zürich 1868) he says that the specimen has a diameter of 37 Decimetres. I have looked up the original text in Armstrong's

account in 1857; it reads: 'The trunk. . . of another, a portion of which was brought on board, was 7 feet in length, and 3 feet in circumference. . . . A section of this piece is to be seen in the Museum of the Royal Dublin Society.'

At that time this (National) Museum was a department of the Royal Dublin Society which established it in 1731. It was not till 1877 that it passed under Government control; and even since then, there have been numerous changes . . .

We have three pieces of *Cupressinoxylon polyommatum*. One of these is the portion below α (where it was cut) of the piece figured by Cramer at Taf. XXXIV, fig. 2, the figure being of natural size. One of the other two pieces, from which microscopical sections appear to have been made, may correspond to the upper portion of this figure, but I cannot say for certain. I have no knowledge of the whereabouts of the micro-sections or of the maker of them (if they exist) . . .

Perhaps I should say that I believe the word 'section' in the above extract from Amstrong's book means a piece or a portion."

Thus the specimen referred by Cramer to *Pinus Mac Clurii* Heer seems to have suffered the fate of so many old species, *viz.* that the type has been lost. But in the case of *Cupressinoxylon polyommatum* we are more fortunate, and, when Dr O'Connor most kindly offered to send it for examination I was very glad to accept. For this great favour, and for the permission to publish a description of it, I am very much obliged, and I beg to express my sincere thanks.

The specimen received (text-fig. 1) was a small piece in the shape of a triangular prisma, 5,4 cm long, the broadest side being 2 cm. It was labelled: '*Cupressinoxylon polyommatum*. Baring Island. Pres. Sir F. L McClintock. H. M. S. "Investigator". 1857', the number 155 having been added later.

In order to save material, if possible, it was attempted to to make cellulose pulls after grinding, polishing, and treating with hydrofluoric acid; but although the method has given good results with other silicified material, it failed here, and the experiments could not be continued, for fear that the acid might spoil the whole specimen. The usual ground sections were then prepared; it was difficult to obtain quite satisfactory results in that way, too, but probably the best of the preparations made show as many details as can be found in a material not better preserved than this.

The preparations figured here were returned to the Dublin Museum, together with the rest of the specimen, while some dupli-

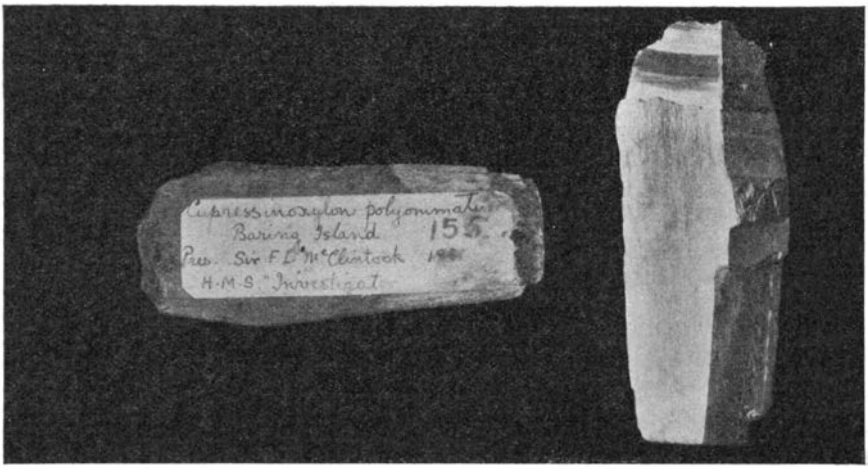

Fig. 1.
Cupressinoxylon polyommatum Cramer. Holotype before cutting (1931). Nat. size.

cates are retained in the Paleontological Museum of the University, Oslo (under the number PA 168).

As already mentioned, the preservation is not very good. Certainly, there has scarcely been any pressure at all; but the fossilisation has been far from complete, and many details of the structure, e. g. the pits, are lost; much is also hidden by a great amount of ferric matter surrounding the walls, so that photographing was difficult, and would have been impossible without a dark red screen.

Anatomy. — The width of the annual rings varies very much, as far as it is observable, 0,7 mm and more than 2 mm having been measured. They are very faintly marked the summer wood consisting of only one or two cells somewhat smaller than all the rest, and scarcely more thickly walled. The tracheids in the cross-section often (but not always) have a peculiar hexagonal outline, because the tangential walls are alternating in the neighbouring rows. The length of the tracheids may at least surpass 2 mm. The bordered pits cannot be traced.

Resin canals of any kind do not occur (a possible exception is mentioned just below).

The medullary rays are numerous. Usually they are about 8 cells high; but 20 cells, and even more, may also be found. Generally they are uniseriate; a single one was found to be partly biseriate,

and further, there is a multiseriate one (Pl. II fig. 7) very much resembling those of woods with horizontal resin ducts. This one does not, however, seem to contain any intercellular canal; as far as can be observed, it consists of the usual cells all through. In the figure there seems to be an opening in the middle; but that is only because the walls of the central cell are not so well visible as in the others in the photograph.

Tracheidal cells in the medullary rays have not been identified, only parenchymatous ones. The pitting, however, is not preserved: In the radial section, no traces of pits are found in the radial walls. In the horizontal ones there are sometimes some interruptions which might be regarded as pits of the abietinean type; but their nature is dubious, and usually the wall is smooth and even. These cells often contain some reddish, dark matter forming globular bodies *about* 10 μ diameter, often with a darker nucleus surrounded by concentric layers; sometimes they are also found in other parts of the wood (see the illustrations). It must be these things which have been interpreted by Cramer as pits.

Xylem parenchyma has not been found at the end of the annual rings, although a considerable number of well preserved places of this kind have been examined in the radial section (where the parenchyma, if present, is usually well visible). But well developed parenchymatous cells have been found more scattered in the other parts of the wood. They are rather narrow, 15—25 μ broad; the length, in one instance (Pl. II fig. 5) has been measured to be 150 μ. Usually they contain some dark matter. Sometimes they are found in long rows between the tracheids, while in other cases only individual cells of this kind are found bordering a tracheid above and below (as in one of the cases figured). The cross-walls are thick, at least sometimes, and seem to have pores resembling the abietinean type of pits.

Affinity. — If it is a certainty that the medullary rays have no abietinean pitting, *Cedroxylon* is excluded, and an affinity to *Cupressinoxylon* is all the more probable. The type of resin parenchyma, scattered between the tracheids, may also be regarded as a hint towards the cupressoid group of fossil wood (cf. Gothan 1905 p. 42); but whether it should be regarded as being most closely related to *Cupressus*, *Taxodium*, or any of the other genera anatomically allied can scarcely be decided, when the pits of the medullary rays are unknown.

With this doubt remaining unsettled, the systematical place, and the taxonomical value, of *Cupressinoxylon polyommatum* will be uncertain. Certainly it has several characteristic features: The slight contrast between the various zones within the annual rings; the occurrence of the xylem parenchyma within the spring wood, and, probably, the thick cross-walls of these cells; the occurrence, however scarce, of biseriate (or even multiseriate, non-resiniferous) medullary rays, &c. But still it cannot be said to be a species sufficiently well characterised, and the name should preferably not be used in future, unless more and better material from the same locality should happen to be collected.

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All literature cited will be found in the bibliographical list in my paper on a collection of fossil wood from East Greenland, Norsk Geol. Tidsskr. XII, 1931, Oslo.

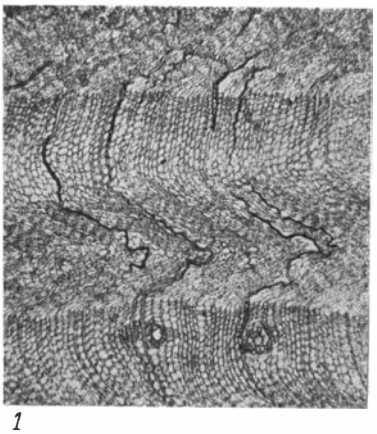
Explanation of Plates.

All figures are from untouched photographs.
The preparations of *Cupressinoxylon polyommatum* belong to the National Museum, Dublin, the others to the Paleontological Museum of the University, Oslo.

Pl. I.

Piceoxylon cf. *laricinoides* Høeg from Jackson Island, East Greenland (PA 118).

Fig. 1. Cross-section. — x 40.
Fig. 2. Tangential section, showing uniseriate medullary rays, and a biseriate one. The dark contents of some of the cells are plainly visible. — x 100.
Fig. 3. As fig. 2. One medullary ray with a resin canal. — x 100.
Fig. 4. Longitudinal (radial) section through a resin canal. — x 100.
Fig. 5. Radial section, with summer wood to the left, and spring wood to the right; on the border, a row of normal xylem parenchyma. In one of the medullary rays the contrast between empty cells and resiniferous ones is distinct. — x 100.
Fig. 6. Cross-section, with two resin canals. — x 100.
Fig. 7. Tangential section, showing a tissue of abnormal xylem parenchyma. — x 40.
Fig. 8. Same as fig. 7, but x 100.



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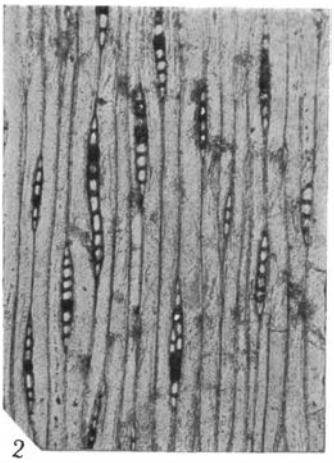

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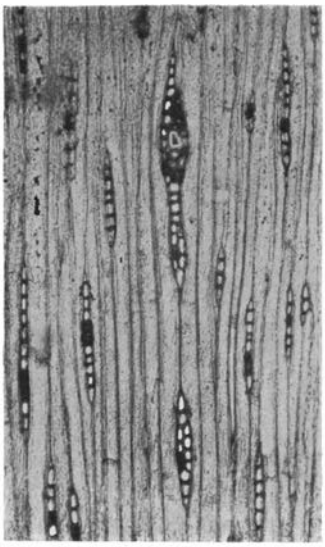

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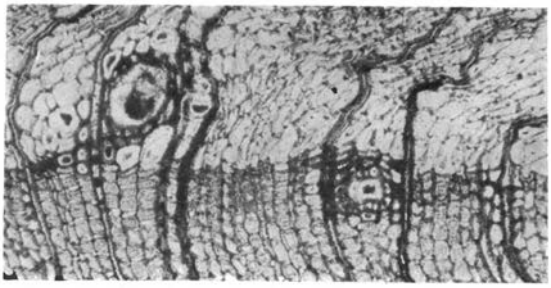

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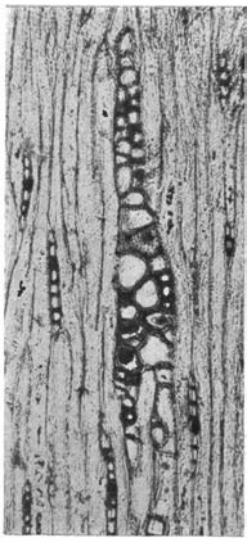

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Pl. II.

Cupressinoxylon polyommatum Cramer. Sections of the holotype.

Fig. 1. Cross-section. Note the slight development of the summer wood. — x 40.

Fig. 2. Radial section, showing the globular bodies interpreted by Cramer as pits. They are visible, more or less plainly, in the tracheids in the upper half of the figure, in the medullary ray in the lower part, and also free in the section to the right. — x 200.

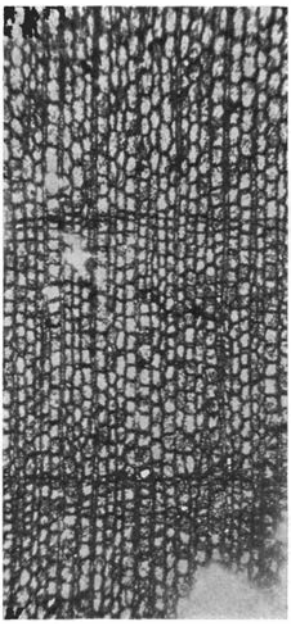
Fig. 3. As fig. 2. Note the bodies resembling pores in the walls of the medullary ray. — x 100.

Fig. 4. Radial section, to illustrate the position of the xylem parenchyma; two such cells are visible (in the centre and in the upper left half). — x 40.

Fig. 5. Detail from fig. 4. The ends of the parenchymatous cell border against tracheids. — x 200.

Fig. 6. As fig. 5. A cross-wall between two parenchymatous cells is plainly visible in the centre. — x 200.

Fig. 7. Tangential section, with a multiseriate medullary ray. — x 100.



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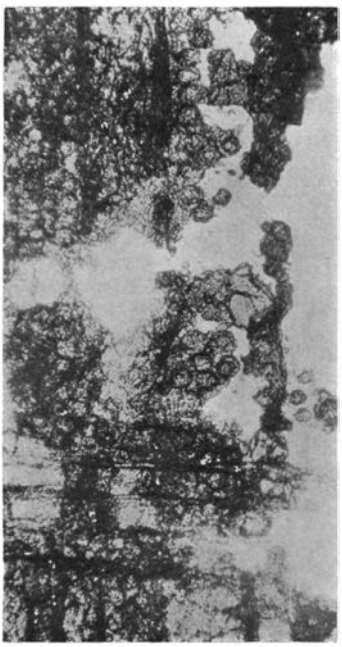

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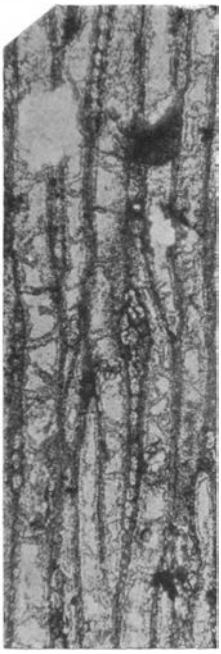

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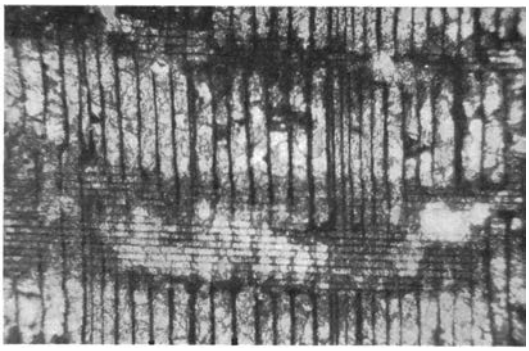
Pl. III.

Fig. 1. *Cupressinoxylon polyommatum* Cramer. Holotype. Radial section. — x 40.
Fig. 2. Same as fig. 1. — x 100.
Fig. 3. Same as fig. 1, in tangential section. — x 40.
Fig. 4. *(?) Cupressinoxylon* from Franz Josef Land (PA 167). Cross-section. — x 10.
Fig. 5. Same as fig. 4. Radial section, with medullary ray. In the left half bordered pits are seen in the tracheids. — x 40.
Fig. 6. Same as fig 4. Tangential section. The light part in the lower left corner is spring wood, the rest is summer wood. — x 40.
Fig. 7. Same as fig 4. Bordered pits on the radial walls of tracheids. — x 100.
Fig. 8. Same as fig. 4. Tangential section. Summer wood in the upper right half, spring wood to the left. On the tangential wall of a tracheid some small bordered pits are visible. — x 100.



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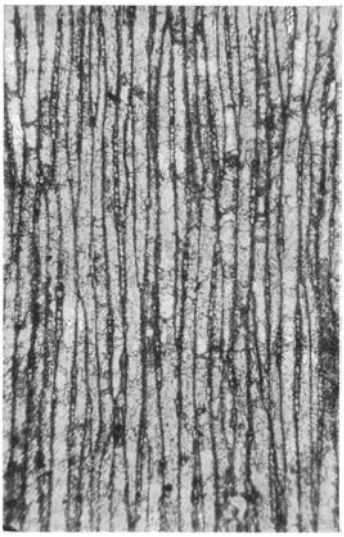

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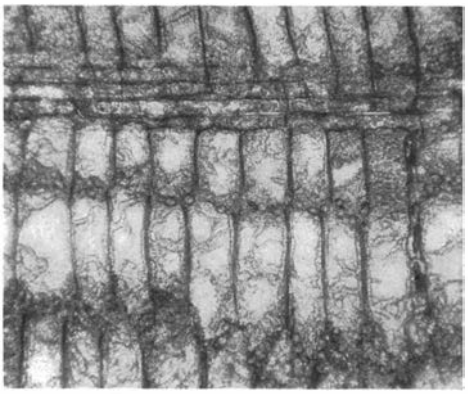

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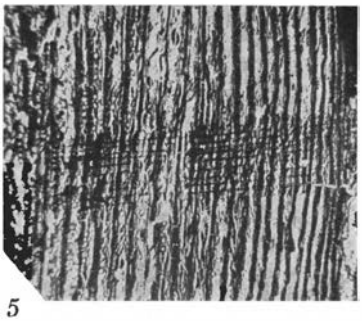

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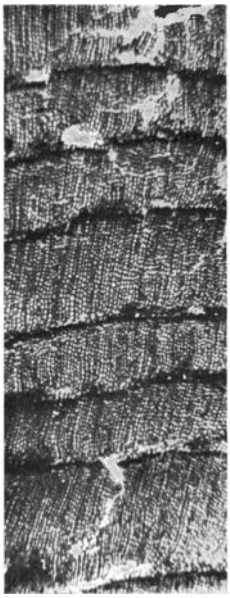

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A. W. BRØGGERS BOKTRYKKERI A/S